USACHPPM
Readiness thru Health

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Just the Facts...

Powassan Encephalitis

Q. ***What is Powassan encephalitis?***
A. Powassan encephalitis is a serious, though rare, North American tick-borne illness caused by Powassan (POW) virus. POW virus is just one of many viruses that are transmitted by arthropods (known as arboviruses) such as mosquitoes and ticks. POW virus is classified as a 'flavavirus' and it is closely related to tick-borne encephalitis viruses found in the Eastern Hemisphere. There are other types of encephalitis viruses present in the U.S. that are transmitted by mosquitoes. They are more common than POW virus and they cause St. Louis, Lacrosse, eastern equine, and western equine encephalitis, all serious infections in humans.

Q. ***When was Powassan encephalitis discovered?***
A. POW virus was first isolated from a patient with encephalitis in 1958 in the town of Powassan, Ontario, Canada. The first recognized case of POW encephalitis in the United States occurred in New Jersey in 1970.

Q. ***How prevalent is Powassan encephalitis?***
A. From 1958 through 1998, 27 cases of human POW encephalitis were reported from Canada and the northeastern United States (Massachusetts, New Jersey, New York). The last case in the U.S. occurred in Massachusetts in 1994. However, during September 1999 to July 2001, 4 new cases were identified in Maine and Vermont after testing for suspected West Nile virus was negative. As surveillance for arthropod-borne viruses continues, the recognized incidence of POW encephalitis may increase.

Q. ***How does a person get Powassan encephalitis?***
A. You can get Powassan encephalitis if you are bitten by a tick that is infected with the POW virus.

Q. ***Can all ticks transmit Powassan virus?***
A. No. In North America, POW virus has been isolated from four tick species: *Ixodes cookei*, *Ixodes marxi*, *Ixodes spinipalpus*, and *Dermacentor andersoni*. Evidence of POW virus infection has been found in 38 mammal species, primarily groundhogs. *Ixodes cookei* commonly infests groundhogs and is suspected to be the primary vector (or transmitter) of POW virus. Unlike *I. scapularis*, the major vector for the bacteria that causes Lyme disease, *I. cookei* rarely search for hosts on vegetation. Instead, they are most often found in or near the nests or burrows of medium-sized mammals and, therefore, rarely contact and bite humans.

Q. ***How serious is Powassan encephalitis?***
A. Like most other arthropod-borne viruses, POW virus may cause no symptoms, or only mild illness, in some individuals. However, when the virus penetrates the central nervous system (CNS), it can cause encephalitis. POW encephalitis is often associated with significant long-term illness and it has a fatality rate of 10% to 15%. Of those patients who survive, many suffer permanent brain damage. There is no vaccine or specific therapy.

Q. ***What are the symptoms of Powassan encephalitis?***
A. When POW virus attacks the CNS, it causes cell death, inflammation and swelling within the brain (encephalitis). The membranous coverings (meninges) of the brain and spinal cord may also become inflamed (meningitis). Symptoms usually begin suddenly 7-14 days following infection, and include headache, fever, nausea and vomiting, stiff neck, and sleepiness. As the disease progresses, more severe symptoms develop, such as breathing distress, tremors, confusion, seizures, coma, paralysis, and sometimes death.

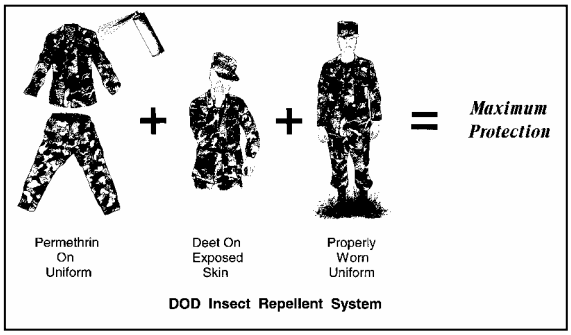
Q. ***How is Powassan encephalitis diagnosed?***
A. Symptoms of different arboviral infections are difficult to distinguish. Therefore, laboratory tests are necessary to confirm diagnosis. These tests are not commercially available, but testing can be performed at the Centers for Disease Control and Prevention (CDC) when requested through state public health laboratories. Blood tests that detect antibodies to POW virus are most often used. Occasionally, POW virus may also be isolated from blood, cerebrospinal fluid, or other tissue.

Q. What is the treatment for Powassan encephalitis?
A. There are no specific treatments or medications for Powassan encephalitis. Therapy is supportive only, directed at relieving the symptoms. This includes good nursing care, administration of intravenous fluids, respiratory support (ventilator), and prevention of secondary infections (pneumonia, urinary tract, etc.). Steroids may sometimes be used to reduce swelling in the brain.

Q. What can I do to reduce my risk of becoming infected with Powassan virus?

A. Help prevent Powassan encephalitis, and other tick-borne diseases, by protecting yourself from ticks. When in tick habitat (tall grass and weeds, scrubby areas, woods and leaf litter), follow these precautions:

- Wear proper clothing as a physical barrier against ticks – long pants tucked into boots or tightly-woven socks; long sleeve shirt; shirt tucked into pants; and light-colored clothing so as to more easily spot ticks.
- Check your skin and clothing periodically for ticks.
- Use both skin and clothing repellents that have been approved by the Environmental Protection Agency (EPA). They are safe and effective.
  - For your skin, use a product that contains 20-50% **DEET** (N,N-diethyl-meta-toluamide). **DEET** in higher concentrations is no more effective.
  - Use **DEET** sparingly on children, and don't apply to their hands, which they often place in their eyes and mouths.
  - Apply **DEET** lightly and evenly to exposed skin; do not use underneath clothing. Avoid contact with eyes, lips, and broken or irritated skin.
  - To apply to your face, first dispense a small amount of **DEET** onto your hands and then carefully spread a thin layer.
  - Wash **DEET** off when your exposure to ticks, mosquitoes, and other arthropods ceases.
  - For your clothing, use a product that contains **permethrin. Permethrin** is available commercially as 0.5% spray formulations.
  - **Permethrin** should only be used on clothing, never on skin.
  - When using any insect repellent, always FOLLOW LABEL DIRECTIONS.
  - Do not inhale aerosol formulations.
- For optimum protection, soldiers should utilize the **DOD INSECT REPELLENT SYSTEM**. In addition to proper wear of the battle dress uniform (BDUs)(pants tucked into boots, sleeves down, undershirt tucked into pants), this system includes the concurrent use of both skin and clothing repellents:
  - Standard military skin repellent: 33% **DEET** lotion, long-acting formulation, one application lasts up to 12 hours, **NSN 6840-01-284-3982**.
  - Standard military clothing repellents, either: aerosol spray, 0.5% **permethrin**, one application lasts through 5-6 washes, **NSN 6840-01-278-1336**; or impregnation kit, 40% **permethrin**, one application lasts the life of the uniform, **NSN 6840-01-345-0237**.



- Reduce contact with small and medium-size wild mammals.
  - Keep yard clear of brush, high grass, weeds, and woodpiles to discourage feeding and nesting of wild mammals.
  - When removing rodent nests, avoid direct contact with nesting materials and use sealed plastic bags for disposal.
- Groom pets to prevent ticks from being carried into the home.

Q. What should I do if I find a tick attached to my skin?

A. Remove attached ticks as soon as they are found. Use tweezers to firmly grasp the tick's mouthparts up against the skin, and pull back firmly and steadily. Be patient – the tick's central mouthpart called the hypostome is covered with sharp barbs, sometimes making removal difficult. Don't pull back sharply, as this may tear the mouthparts from the body, leaving them embedded in the skin. If the mouthparts do break off, don't panic – the mouthparts alone cannot transmit disease because the infective body of the tick is no longer attached. However, to prevent secondary infection, remove the mouthparts as you would a splinter. Never squeeze the body of the tick or use such things as petroleum jelly, fingernail polish remover, or a lighted match: these methods could force more infective fluid into the skin. After removal, wash the wound site, and apply an antiseptic. Preserve the tick by placing it in a clean, dry jar, or other well-sealed container, and keeping it in your freezer. Should you develop disease symptoms, take the tick with you to the physician's office; identification of the tick species may assist the physician with your diagnosis and treatment. Discard the tick after a month; all known tick-borne diseases will generally display symptoms within this time period.

Q. Where can I get more information on Powassan and other types of arthropod-borne viral encephalitis?

A. Contact the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Entomological Sciences Program, Aberdeen Proving Ground, Maryland 21010-5403: http://chppm-www.apgea.army.mil/ento; DSN 584-3613; CM (410) 436-3613; FAX –2037. Additional information can also be obtained from your local, county, or state health departments, your health care provider, or the U.S. Centers for Disease Control and Prevention (CDC): http://www.cdc.gov/ncidod/dvbid/arbor/arbdet.htm.